

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

In re Patent Application of )  
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Tadashi OHKUMA et al ) Group Art Unit: Unassigned  
 )  
Application No.: Unassigned ) Examiner: Unassigned  
 )  
Filed: September 24, 2001 )  
 )  
For: ACRYLIC ESTER COMPOUND )  
AND USAGE THEREOF )

**PRELIMINARY AMENDMENT**

Assistant Commissioner for Patents  
Washington, D.C. 20231

Sir:

Prior to examination of the above-captioned patent application, kindly enter the following amendment.

**IN THE SPECIFICATION:**

Kindly replace the paragraph bridging pages 34, line 14, to page 37, line 11, with the following:

The photopolymerization initiator includes, for example, carbonyl compounds such as benzophenone, 4-methylbenzophenone, 4,4'-dichlorobenzophenone, 2,4,6-trimethylbenzophenone, methyl o-benzoylbenzoate, 4-phenylbenzophenone, 4-(4-methylphenylthio)benzophenone, 3,3-dimethyl-4-methylbenzophenone,

4-(1,3-acryloyl-1,4,7,10,13-pentaoxatridecyl)benzophenone, 3,3',4,4'-tetra(tert-butylperoxycarbonyl) benzophenone, 4-benzoyl-N,N,N-methylbenzenemethanaminium chloride, 2-hydroxy-3-(4-benzoylphenoxy)-N,N,N-trimethyl-1-propanaminium chloride, 4-benzoyl-N,N-dimethyl-N-[(2-(1-oxo-2-propenoxy)ethyl]benzenemethanaminium chloride, 4-benzoyl-N,N-dimethyl-N-[2-(1-oxo-2-propenyloxy)ethyl]-benzenemethanaminium bromide, 2-isopropylthioisopropylthioxanthone, 4-isopropylthioxanthone, 2,4-dimethylthioxanthone, 2,4-diethylthioxanthone, 2,4-diisopropylthioxanthone, 2,4-dichlorothioxanthone, 1-chloro-4-propoxythioxanthone 2-hydroxy-3-(3,4-dimethyl-9-oxo-9H-thioxanthon-2-yloxy)-N,N,N-trimethyl-1-propanaminium chloride, 2-benzoylmethylene-3-methylnaphtho(1,2-d)thiazoline; dicarbonyl compounds such as benzyl, 1,7,7-trimethyl-bicyclo[2,2,1]heptane-2,3-dione (common name: camphorquinone), 2-methylantraquinone, 2-ethylantraquinone, 2-tert-butylantraquinone, 1-chloroanthraquinone, 2-amyliantraquinone, 9,10-phenanthlenequinone, methyl a-oxobenzene acetate; acetophenone compounds such as acetophenone, 2-hydroxy-2-methyl-1-phenylpropan-1-one, 1-(4-isopropylphenyl)-2-hydroxy-2-methylpropan-1-one, 1-[4-(2-hydroxyethoxy)phenyl]-2-hydroxy-2-methylpropan-1-one, 1-hydroxycyclohexylphenylketone, dimethoxyacetophenone, diethoxyacetophenone, 2,2-dimethoxy-1,2-diphenylethan-1-one, 2,2-diethoxy-1,2-diphenylethan-1-one, 1,1-dichloroacetophenone, N,N-dimethylaminoacetophenone, 2-methyl-1-(4-methylthiophenyl)-2-morpholinopropan-1-one, 2-benzyl-2-dimethylamino-1-(4-morpholinophenyl)butan-1-one, 1-phenyl-1,2-propanedione-2-(o-ethoxycarbonyl)oxym, 3,6-bis(2-methyl-2-morpholinopropanoyl)-9-butylcarbazole; benzoin and benzoin ether compounds such as benzoin methyl ether,

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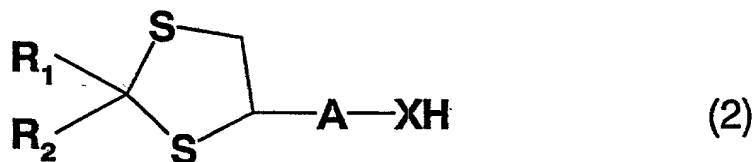
benzoin ethyl ether, benzoin isopropyl ether, benzoin -n-butyl ether, benzoin isobutyl ether; aryl phosphine oxide compounds such as 2,4,6-trimethylbenzoyldiphenylphosphine oxide, bis(2,6-dichlorobenzoyl)-(4-n-propylphenyl)phosphine oxide; aminocarbonyl compounds such as methyl 4-dimethylaminobenzoate, ethyl 4-dimethylaminobenzoate, 4-dimethylaminobenzoate-n-butoxyethyl ester, isoamyl 4-dimethylaminobenzoate, benzoate-2-dimethylaminoethyl ester, 4,4'-bis(dimethylamino)benzophenone (Michler's ketone), 4,4'-bis(diethylamino)benzophenone, 2,5'-bis(4-dimethylaminobenzal)cyclopentanone; halogenated compounds such as 2,2,2-trichloro-1-(4'-tert-butylphenyl)ethan-1-one, 2,2-dichloro-1-(4-phenoxyphenyl)ethan-1-one, a,a,a-tribromomethylphenylsulfone, 2,4,6-tris(trichloromethyl)triazine, 2,4-bis(trichloromethyl)-6-(4-methoxyphenyl) triazine, 2,4-bis(trichloromethyl)-6-(4-methoxystyryl) triazine, 2,4-bis(trichloromethyl)-6-(3,4-methylenedioxyphenyl) triazine, 2,4-bis(trichloromethyl)-6-(4-methoxynaphthyl) triazine, 2,4-bis(trichloromethyl)-6-[2-(5-methylfuryl)etyldiyne] triazine, 2,4-bis(trichloromethyl)-6-[2-furyletyldiyne] triazine; other well-known compounds such as 9-phenylacridine, 2,2'-bis(o-chlorophenyl)-4,4',5,5'-tetraphenyl-1,2-biimidazole, 2,2-azobis(2-amino-propane)dihydrochloride, 2,2-azobis[2-(imidazolin-2-yl)propane]dihydrochloride,  $\eta$ -5-2-4-(cyclopentadienyl)(1,2,3,4,5,6, $\eta$ )-(methylethyl)benzene]iron(II) hexafluorophosphate, bis(5-cyclopentadienyl)bis[2,6-difluoro-3-(1H-pyr-1-yl)-phenyl] titanium. These may be used singly or in combination of two or more thereof.

**IN THE CLAIMS:**

Kindly replace claims 3, 6, and 8, and add new claims 11-18, as follows.

3. (Amended) A polymerizable composition comprising the acrylic ester compound according to claim 2.

6. (Amended) A manufacturing method of the acrylic ester compound according to claim 2, wherein a sulfur-containing compound represented by the general formula (2) is esterified to form an acrylic ester:



wherein,  $R_1$  and  $R_2$  represent independently a hydrogen atom, an alkyl group which may have a substituent, an aromatic alkyl group which may have a substituent or an aromatic residue which may have a substituent, respectively; A represents a divalent organic group; and X represents a sulfur atom or an oxygen atom; provided that when X is an oxygen atom,  $R_1$  represents an aromatic residue that may have a substituent.

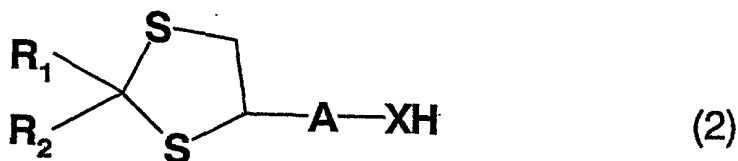
8. (Amended) The manufacturing methods according to claim 7, wherein esterification to form an acrylic ester is performed by reacting the compound represented by the general formula (2) with halopropionic acids or acid halides thereof to form a halopropionic acid compound and then by dehalogenating the halopropionic acid compound.

11. (New) A polymerizable composition comprising the acrylic ester compound according to claim 1.

12. (New) A cured article obtained by polymerizing the polymerizable composition according to claim 11.

13. (New) An optical component comprising the cured article according to claim 12.

14. (New) A manufacturing method of the acrylic ester compound according to claim 1, wherein a sulfur-containing compound represented by the general formula (2) is esterified to form an acrylic ester:



wherein,  $R_1$  and  $R_2$  represent independently a hydrogen atom, an alkyl group which may have a substituent, an aromatic alkyl group which may have a substituent or an aromatic residue which may have a substituent, respectively; A represents a divalent organic group; and X represents a sulfur atom or an oxygen atom; provided that when X is an oxygen atom,  $R_1$  represents an aromatic residue that may have a substituent.

15. (New) The manufacturing method according to claim 14, wherein in the general formula (2)  $R_1$  represents an aromatic residue which may have a substituent, A represents  $-(CH_2)_m-$  (m is an integer from 1 to 3) and X represents a sulfur atom.

16. (New) The manufacturing method according to claim 15, wherein esterification to form an acrylic ester is performed by reacting the compound represented by the general formula (2) with halopropionic acids or acid halides thereof to form a halopropionic acid compound and then by dehalogenating the halopropionic acid compound.

17. (New) The manufacturing method according to claim 14, wherein esterification to form an acrylic ester is performed by reacting the compound represented by the general formula (2) with halopropionic acids or acid halides thereof to form a halopropionic acid compound and then by dehalogenating the halopropionic acid compound.

18. (New) The manufacturing method according to claim 6, wherein esterification to form an acrylic ester is performed by reacting the compound represented by the general formula (2) with halopropionic acids or acid halides thereof to form a halopropionic acid compound and then by dehalogenating the halopropionic acid compound.

**REMARKS**

By the instant Preliminary Amendment, the specification has been revised to correct an apparent omission. That is, each of the revised compounds on pages 36-37 refers to the 2,4- locations, but inadvertently fails to specify that two of the trichloromethyl groups (hence the term "bis") are located at such positions. The revisions also use only the chemical name which uses "methylenedioxyphenyl" rather than "piperonyl".

The instant Preliminary Amendment also eliminates all multiple dependency while adding dependent claims 11-18 so that the scope of the original claims is preserved. It is to be understood that the revisions to the claims are solely for formalistic purposes and not with regard to patentability.

Favorable consideration on the merits is respectfully requested.

Respectfully submitted,

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Date: September 24, 2001

**Attachment to Preliminary Amendment dated September 24, 2001**

**Marked-up Copy**

Page 34, Line 14, to page 37, Line 11

The photopolymerization initiator includes, for example, carbonyl compounds such as benzophenone, 4-methylbenzophenone, 4,4'-dichlorobenzophenone, 2,4,6-trimethylbenzophenone, methyl o-benzoylbenzoate, 4-phenylbenzophenone, 4-(4-methylphenylthio)benzophenone, 3,3-dimethyl-4-methylbenzophenone, 4-(1,3-acryloyl-1,4,7,10,13-pentaoxatridecyl)benzophenone, 3,3',4,4'-tetra(tert-butylperoxycarbonyl) benzophenone, 4-benzoyl-N,N,N-methylbenzenemethanaminium chloride, 2-hydroxy-3-(4-benzoylphenoxy)-N,N,N-trimethyl-1-propanaminium chloride, 4-benzoyl-N,N-dimethyl-N-[(2-(1-oxo-2-propenoxy)ethyl]benzenemethanaminium chloride, 4-benzoyl-N,N-dimethyl-N-[2-(1-oxo-2-propenyloxy)ethyl]-benzenemethanaminium bromide, 2-isopropylthioisopropylthioxanthone, 4-isopropylthioxanthone, 2,4-dimethylthioxanthone, 2,4-diethylthioxanthone, 2,4-diisopropylthioxanthone, 2,4-dichlorothioxanthone, 1-chloro-4-propoxythioxanthone 2-hydroxy-3-(3,4-dimethyl-9-oxo-9H-thioxanthon-2-yloxy)-N,N,N-trimethyl-1-propanaminium chloride, 2-benzoylmethylene-3-methylnaphtho(1,2-d)thiazoline; dicarbonyl compounds such as benzyl, 1,7,7-trimethyl-bicyclo[2,2,1]heptane-2,3-dione (common name: camphorquinone), 2-methylantraquinone, 2-ethylantraquinone, 2-tert-butylantraquinone, 1-chloroanthraquinone, 2-amylantraquinone, 9,10-phenanthlenequinone, methyl a-oxobenzene acetate; acetophenone compounds such as acetophenone, 2-hydroxy-2-methyl-1-phenylpropan-1-one, 1-(4-isopropylphenyl)-2-hydroxy-2-methylpropan-1-one, 1-[4-(2-hydroxyethoxy)phenyl]-2-



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hydroxy-2-methylpropan-1-one, 1-hydroxycyclohexylphenylketone,  
dimethoxyacetophenone, diethoxyacetophenone, 2,2-dimethoxy-1,2-diphenylethan-1-one,  
2,2-diethoxy-1,2-diphenylethan-1-one, 1,1-dichloroacetophenone, N,N-  
dimethylaminoacetophenone, 2-methyl-1-(4-methylthiophenyl)-2-morpholinopropan-1-one,  
2-benzyl-2-dimethylamino-1-(4-morpholinophenyl)butan-1-one, 1-phenyl-1,2-propanedione-  
2-(o-ethoxycarbonyl)oxym, 3,6-bis(2-methyl-2-morpholinopropanoyl)-9-butylcarbazole;  
benzoin and benzoin ether compounds such as benzoin methyl ether,  
benzoin ethyl ether, benzoin isopropyl ether, benzoin -n-butyl ether, benzoin isobutyl  
ether; aryl phosphine oxide compounds such as 2,4,6-trimethylbenzoyldiphenylphosphine  
oxide, bis(2,6-dichlorobenzoyl)-(4-n-propylphenyl)phosphine oxide; aminocarbonyl  
compounds such as methyl 4-dimethylaminobenzoate, ethyl 4-dimethylaminobenzoate, 4-  
dimethylaminobenzoate-n-butoxyethyl ester, isoamyl 4-dimethylaminobenzoate, benzoate-2-  
dimethylaminoethyl ester, 4,4'-bis(dimethylamino)benzophenone (Michler's ketone), 4,4'-  
bis(diethylamino)benzophenone, 2,5'-bis(4-dimethylaminobenzal)cyclopentanone;  
halogenated compounds such as 2,2,2-trichloro-1-(4'-tert-butylphenyl)ethan-1-one, 2,2-  
dichloro-1-(4-phenoxyphenyl)ethan-1-one, a,a,a-tribromomethylphenylsulfone, 2,4,6-  
tris(trichloromethyl)triazine, [2,4-trichloromethyl-6-(4-methoxyphenyl)triazine, 2,4-  
trichloromethyl-6-(4-methoxystyryl)triazine, 2,4-trichloromethyl-6-piperonyl-triazine (i.e.,  
3,4-methylenedioxyphenyl triazine), 2,4-trichloromethyl-6-(4-methoxynaphthyl)triazine,  
2,4-trichloromethyl-6-[2-(5-methylfuryl)ethylidene]triazine, 2,4-trichloromethyl-6-[2-

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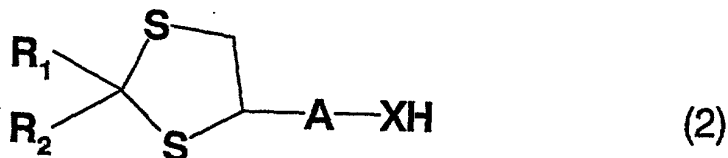
furyletyldyneltriazine]; 2,4-bis(trichloromethyl)-6-(4-methoxyphenyl) triazine, 2,4-  
bis(trichloromethyl)-6-(4-methoxystyryl) triazine, 2,4-bis(trichloromethyl)-6-(3,4-  
methylenedioxyphenyl) triazine, 2,4-bis(trichloromethyl)-6-(4-methoxynaphthyl) triazine,  
2,4-bis(trichloromethyl)-6-[2-(5-methylfuryl)etyldiyne] triazine, 2,4-bis(trichloromethyl)-6-  
[2-furyletyldiyne] triazine; other well-known compounds such as 9-phenylacridine, 2,2'-  
bis(o-chlorophenyl)-4,4',5,5'-tetraphenyl-1,2-biimidazole, 2,2'-azobis(2-amino-  
propane)dihydrochloride, 2,2'-azobis[2-(imidazolin-2-yl)propane]dihydrochloride, η-5-2-4-  
(cyclopentadienyl)(1,2,3,4,5,6,η)-(methylethyl)benzene]iron(II) hexafluorophosphate,  
bis(5-cyclopentadienyl)bis[2,6-difluoro-3-(1H-pyr-1-yl)-phenyl] titanium. These may be  
used singly or in combination of two or more thereof.

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**Marked-up Claims 3, 6, and 8**

3. (Amended) A polymerizable composition comprising the acrylic ester compound according to claim [1 or] 2.

6. (Amended) A manufacturing method of the acrylic ester compound according to claim [1 or] 2, wherein a sulfur-containing compound represented by the general formula (2) is esterified to form an acrylic ester:



wherein, R<sub>1</sub> and R<sub>2</sub> represent independently a hydrogen atom, an alkyl group which may have a substituent, an aromatic alkyl group which may have a substituent or an aromatic residue which may have a substituent, respectively; A represents a divalent organic group; and X represents a sulfur atom or an oxygen atom; provided that when X is an oxygen atom, R<sub>1</sub> represents an aromatic residue that may have a substituent.

8. (Amended) The manufacturing [methods] method according to claim [6 or] 7, wherein esterification to form an acrylic ester is performed by reacting the compound represented by the general formula (2) with halopropionic acids or acid halides thereof to form a halopropionic acid compound and then by dehalogenating the halopropionic acid compound.